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Except for specially designed product, Macronix' products shall not be used for applications relating to nuclear facility, military, life saving, life sustaining, aircraft, or systems where failure or malfunction may result in personal injury.

# MACRONIX

## PRODUCT SELECTION GUIDE

- Serial NOR Flash Memory
- Parallel NOR Flash Memory
- NAND Flash Memory
- Read-Only Memory



# Your Partner in Innovation for Today and Tomorrow

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Unique 3DVG  
NAND Design

Invention on  
Self-Healing  
Flash



# About Macronix

Macronix, the leading provider of NVM (Non-Volatile Memory) semiconductor solutions, is the world's leading supplier of ROM and Serial NOR Flash products. The company currently produces a wide range of ROM, NOR Flash, and NAND Flash memories across various densities in embedded, consumer, enterprise, wireless, and automotive applications. Our innovative flash products are also available in packages with small footprints and thin profiles for space-constrained applications.

Macronix is one of the few IDM (Integrated Device Manufacturer) companies worldwide with complete Design, Manufacturing, and Marketing capabilities under its own Brand. Macronix dedicates itself to developing superior homegrown technologies and consistently improving its manufacturing processes in order to offer its customers quality products and services.

## PRODUCT

Macronix offers a wide range of Serial Flash products with densities from 512Kb to 512Mb. To meet market trends, we provide Flash products with extremely small and thin packages for space-constrained applications. In addition, our first-generation SLC (Single-Level Cell) NAND Flash product family is ideal for embedded applications demanding high quality and reliability. In our ROM business, XtraROM® products with 45-nanometer process have been delivered. Macronix also offers a KGD (Known Good Die) program for SIP (System In Package) solutions. Always looking ahead, Macronix will maintain its position on the forefront of advanced technology research and development, focusing on NVM (Non-Volatile Memory) products.

## SERVICE

Macronix is committed to providing reliable and efficient support to satisfy customers' expectations for long-lasting partnerships. Macronix customers are served by a dedicated service team with extensive global logistics coverage, a dependable product roadmap, and innovative next-generation technology.

## MANUFACTURING

Macronix has over 20 years of IDM experience with excellent in-house design and manufacturing capabilities, which facilitate continuous improvement in all aspects of the development and production cycle. We strive to achieve the common goal we share with our customers – to provide high-quality, reliable and eco-friendly products.

## QUALITY

Our stringent quality standards, based on the ISO 9001 philosophy, have resulted in TS 16949 certification. With the mindset of building a responsible business, Macronix is certified in ISO 14001 (Environmental Management), IECQ QC 080000 (Hazardous Substances Management), and SA 8000 (Social Accountability Management).

Our Green Product Management system is highly regarded in the industry as well. Macronix has been granted green partnerships with SONY, Nintendo, Samsung, LG, and Canon. No Macronix products use "Conflict Metals," as they are known, for raw materials. Our products are ROHS-compliant, Halogen-free, Phthalate-free, and SVHC-free (Substances of Very High Concern). To fully comply with Green Product Requirements, Macronix works closely with our supply chain partners under a well-run program.



## MACRONIX HAS RECEIVED

- Green Product Certifications from well-known electronics companies
- Social Accountability Management SA 8000 Certificate
- ISO 14064 GreenHouse Gases Emissions Verification



# Serial NOR Flash

Macronix designs and manufactures Serial Flash products from 512Kb to 512Mb. We also offer backward-compatible, high-performance Serial Flash, MXSMIO® (Multi-I/O) family and MXSMIO® Duplex (DTR) family, as described below:

## MX25xxx06 - Standard Serial Interface Series

The MX25xxx06 series provides Standard Serial Interface x1 or x2 I/O [Single I/O or Dual I/O] at a single 3V or 2.5V power-supply voltage. These products are offered with 4KB sectors and 64KB blocks, in densities ranging from 512Kb to 64Mb.

## MX25xxx08 - Unique ID Series

The MX25xxx08 series provides a 512-bit secured area, independent from the main array, to store unique ID data for the system identifier. These products are offered in densities from 8Mb to 64Mb.

## MX25xxx26 - Default Lock Protection Series

The default lock protection series is optimized for Parameter Protection applications. These products utilize the BP volatile protection bits to protect selected boot areas of memory against misuse of programs, and to erase instructions in the protected area.

## MX25xxx35/36/45 - MXSMIO® (Multi-I/O) & MXSMIO® Duplex (DTR) Series

Macronix Serial Multi-I/O (MXSMIO®) Flash provides two kinds of Multi-I/O interfaces: the MX25xxx35 series, which offers a Multi-in / Multi-out interface, and the MX25xxx36 series, which offers a Single-in / Multi-out interface.

Both series are available on Quad I/O operation, which quadruples the read performance of systems for high-end consumer applications. The MX25xxx35 and MX25xxx36 families are provided in densities from 2Mb to 512Mb.

Furthermore, the MXSMIO® Duplex family, the MX25xxx45 series, offers a Quad I/O interface with DTR (Double Transfer Rate) mode operation providing a fast data transfer rate of up to 400MHz, which makes it the fastest Serial Flash in the industry. The MXSMIO® Duplex family is offered in densities from 64Mb to 128Mb with independent block lock protection on the boot sector.



## Serial Flash Function List

Function \ Device	3V												1.8V	
	xx06E	xx08E	xx26E	xx33E	8035E/1635E	3235E/6435E	xx35F	8036E/1636E	xx73E/F	xx45E	xx55F	3255E/6456E	U2033E/4033E/8033E	U1635F
H/W Reset Pin							●				●			●
H/W Hold# Pin	●	●	●			●						●		
1I/O (1-1-1)	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1I/2O (1-1-2)	●	●	●			●	●	●	●		●	●		
2I/O (1-2-2)**				●	●	●	●	●	●	●	●	●	●	●
1I/4O (1-1-4)**						●	●		●		●	●		
4I/O (1-4-4)**				●	●	●	●	●	●	●	●	●	●	●
QPI (4-4-4)**							●		●*		●			●
DTR function										●				
BPx Bits (NVM)	●	●		●	●	●	●	●	●	●	●	●	●	●
BPx Bits (SRAM)			●											
WPSEL Mode (BPx mode individual WP mode)						●	●		●	●	●	●	●	●
Security Function (BPG, read lock)											●	●		
Security OTP & Register	●	●		●	●	●	●	●	●	●	●	●	●	●
Unique ID		●												
CP mode						●				●		●		
Note														
* 128Mb Only														
** I/O Nomenclature defined in Command, Address (Input), Data (Output) Configuration														
For eg: 1-1-1 denotes 1-Command, 1-Address (Input), 1-Data (Output)														

## Serial Flash Portfolio Table

		512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb
3V	MX25Lxx06 Standard Serial Interface	●	●	●	●	●	●	●	●			
	MX25Lxx08 Unique ID series					●	●	●	●			
	MX25Lxx26 Default Lock Protection series		●	●	●			●				
	MX25Lxx35/36/45 MX66Lxx35 MXSMIO® & MXSMIO® Duplex series					●	●	●	●	●	●	●
	MX25Lxx55 MXSMIO® Secure series						●	●	●	●	●	
	MX25Lxx73 MXSMIO® series (Quad I/O Permanent Enable)					●	●	●	●	●		
2.5V	MX25Vxx06 Standard Serial Interface	●	●	●	●	●						
	MX25Vxx35 MXSMIO® series				●	●						
1.8V	MX25Uxx35/33 MXSMIO® series			●	●	●	●	●	●	●	●	



3V Serial Flash Family

Part number	Density	Organization	I/O Bus	Frequency (MHz)	Package	Voltage	Automotive Grade
Standard Serial Interface Series:							
MX25L512E	512Kb	4KB / 64KB	Single / Dual	104(x1), 80(x2)	150mil 8-SOP, 8-TSSOP, 8-USON(2x3mm), WLCSP	2.7~3.6V	
MX25L5121E	512Kb	4KB / 64KB	Single	45	150mil 8-SOP, 173mil 8-TSSOP, 8-USON(2x3mm)	2.7~3.6V	
MX25L1006E	1Mb	4KB / 64KB	Single / Dual	104(x1), 80(x2)	150mil 8-SOP, 8-USON(2x3mm), WLCSP	2.7~3.6V	-40°C to 105°C
MX25L1021E	1Mb	4KB / 64KB	Single	45	150mil 8-SOP	2.7~3.6V	
MX25L2006E	2Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	150mil 8-SOP, 8-USON(2x3mm) 8-WSON(6x5mm)	2.7~3.6V	-40°C to 125°C
MX25L4006E	4Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	150mil 8-SOP, 200mil 8-SOP, 300mil 8-PDIP, 8-USON(2x3mm) 8-WSON(6x5mm)	2.7~3.6V	-40°C to 125°C
MX25L8006E	8Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	150mil 8-SOP, 200mil 8-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm)	2.7~3.6V	-40°C to 125°C
MX25L1606E	16Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	150mil 8-SOP, 200mil 8-SOP, 300mil 16-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm), 24-TFBGA(6x8mm)	2.7~3.6V	-40°C to 125°C
MX25L3206E	32Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	200mil 8-SOP, 300mil 16-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm), 24-TFBGA(6x8mm)	2.7~3.6V	-40°C to 105°C
MX25L6406E	64Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm), 8-WSON(8x6mm), 200mil 8VSOP, 24-TFBGA(6x8mm)	2.7~3.6V	
Default Lock Protection Series							
MX25L1026E	1Mb	4KB / 64KB	Single / Dual	104(x1), 86(x2)	150mil 8-SOP	2.7~3.6V	
MX25L2026E	2Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	150mil 8-SOP	2.7~3.6V	
MX25L4026E	4Mb	4KB / 64KB	Single / Dual	86(x1), 80(x2)	150mil 8-SOP	2.7~3.6V	

3V Serial Flash Family: MXSMIO® (Multi-I/O) & MXSMIO® Duplex (DTR) Series

Part number	Density	Organization	I/O Bus	Frequency(MHz)	Package	Voltage	Features	Automotive Grade
MX25L8035E	8Mb	4KB / 64KB	Single / Dual / Quad	108(x1, x4), 80(x2)	200mil 8-SOP	2.7~3.6V		
MX25L8036E	8Mb	4KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	200mil 8-SOP	2.7~3.6V		
MX25L8073E	8Mb	4KB / 64KB	Single / Dual / Quad	108(x1, x4), 80(x2)	200mil 8-SOP	2.7~3.6V		
MX25L1633E	16Mb	4KB / 64KB	Single / Dual / Quad	104(x1), 85(x2, x4)	200mil 8-SOP, 8-WSON(6x5mm), 8-USON(4x4mm)	2.7~3.6V		-40°C to 125°C
MX25L1635E	16Mb	4KB / 64KB	Single / Dual / Quad	108(x1, x4), 80(x2)	200mil 8-SOP	2.7~3.6V		
MX25L1636E	16Mb	4KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	200mil 8-SOP	2.7~3.6V		
MX25L1673E	16Mb	4KB / 64KB	Single / Dual / Quad	104(x1), 85(x2, x4)	200mil 8-SOP, 8-WSON(6x5mm)*, 8-USON(4x4mm)*	2.7~3.6V		
MX25L3235E	32Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 86(x2)	200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm)	2.7~3.6V		-40°C to 125°C
MX25L3273E	32Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 86(x2)	200mil 8-SOP, 200mil 8-VSOP, 300mil 16-SOP*, 8-WSON(6x5mm)*	2.7~3.6V		
MX25L6435E	64Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 86(x2)	200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm), 8-WSON(8x6mm), 24-TFBGA(6x8mm)	2.7~3.6V		-40°C to 125°C
MX25L6473E	64Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 86(x2)	200mil 8-SOP, 200mil 8-VSOP, 300mil 16-SOP*, 8-WSON(6x5mm)	2.7~3.6V		
MX25L12835F	128Mb	4KB / 32KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	200mil 8-SOP 300mil 16-SOP 8-WSON(6x5mm) 8-WSON(8x6mm)	2.7~3.6V	QPI	-40°C to 105°C
MX25L12873F	128Mb	4KB / 32KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm)	2.7~3.6V	QPI	
MX25L25635F	256Mb	4KB / 32KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	300mil 16-SOP 8-WSON(8x6mm)	2.7~3.6V	QPI	-40°C to 105°C
MX25L25735F	256Mb	4KB / 32KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	300mil 16-SOP 8-WSON(8x6mm)	2.7~3.6V	QPI	
MX66L51235F	512Mb	4KB / 32KB / 64KB	Single / Dual / Quad	133(x1, x2, x4)	300mil 16-SOP 8-WSON(8x6mm) 24-TFBGA(6x8mm)	2.7~3.6V	QPI	

\* Advance Information

2.5V Serial Flash Family: Standard Serial Interface Series

Part Number	Density	Organization	I/O Bus	Frequency (MHz)	Package
MX25V512E	512Kb	4KB / 64KB	Single / Dual	75(x1), 70(x2)	150mil 8-SOP, 173mil 8-TSSOP, 8-WSON(2x3mm)
MX25V1006E	1Mb	4KB / 64KB	Single / Dual	75(x1), 70(x2)	150mil 8-SOP, 173mil 8-TSSOP, 8-WSON(2x3mm)
MX25V2006E	2Mb	4KB / 64KB	Single / Dual	75(x1), 70(x2)	150mil 8-SOP, 8-WSON(6x5mm)
MX25V4006E	4Mb	4KB / 64KB	Single / Dual	75(x1), 70(x2)	150mil 8-SOP, 8-WSON(6x5mm)
MX25V8006E	8Mb	4KB / 64KB	Single / Dual	75(x1), 70(x2)	150mil 8-SOP, 8-WSON(6x5mm)



2.5V Serial Flash Family: MXSMIO® (Multi-I/O) Series

Part Number	Density	Organization	I/O Bus	Frequency (MHz)	Package
MX25V4035	4Mb	4KB /32KB / 64KB	Single / Dual / Quad	66(x1), 50(x2, x4)	150mil 8-SOP, 8-WSO(6x5mm)
MX25V8035	8Mb	4KB / 32KB / 64KB	Single / Dual / Quad	66(x1), 50(x2, x4)	150mil 8-SOP, 8-WSO(6x5mm)

1.8V MXSMIO® Family

Part Number	Density	Organization	I/O Bus	Frequency (MHz)	Package	Feature
MX25U2033E	2Mb	4KB / 32KB / 64KB	Single / Dual / Quad	80(x1, x2), 70(x4)	150mil 8-SOP, 8-WSO(6x5mm), 8USO(4x4mm), WLCSP	
MX25U4033E	4Mb	4KB / 32KB / 64KB	Single / Dual / Quad	80(x1, x2), 70(x4)	150mil 8-SOP, 8-WSO(6x5mm), 8USO(4x4mm), WLCSP	
MX25U8033E	8Mb	4KB / 32KB / 64KB	Single / Dual / Quad	80(x1, x2), 70(x4)	150mil 8-SOP, 8-WSO(6x5mm), 8USO(4x4mm), WLCSP	
MX25U1635F	16Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 84(x2)	150mil 8-SOP,200mil 8-SOP, 8-WSO(6x5mm), 8-USO(4x3mm) 8-USO(4x4mm), WLCSP	QPI
MX25U3235F	32Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 84(x2)	200mil 8-SOP, 8-WSO(6x5mm)	QPI
MX25U6435F	64Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 84(x2)	200mil 8-SOP, 8-WSO(6x5mm)	QPI
MX25U12835F	128Mb	4KB / 32KB / 64KB	Single / Dual / Quad	104(x1, x4), 84(x2)	300mil 16-SOP, 8-WSO(6x5mm)	QPI
MX25U25635F	256Mb	4KB / 32KB / 64KB	Single / Dual / Quad	108(x1, x2, x4) 133(x1, x2, x4)	300mil 16-SOP, 8-WSO(8x6mm) 8-WSO(8x6mm) 3.4X4.3EP	QPI
MX66U51235F	512Mb	4KB / 32KB / 64KB	Single / Dual / Quad	108(x1, x2, x4)	300mil 16-SOP, 8-WSO(8x6mm) 8-WSO(8x6mm) 3.4x4.3EP	QPI

Applications

Segment	Application	512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb
Computer	Mobile PC				●	●	●	●	●			
	DeskTop PC					●	●	●	●			
	Server						●	●	●	●	●	●
	Printer						●	●	●	●	●	●
	Graphics	●	●	●								
	HDD		●	●	●	●						
	ODD			●	●	●	●	●				
Communication	DSL					●	●	●	●			
	Cable Modem						●	●	●	●		
	IAD/Home Gateway								●	●	●	●
	WiMAX							●	●	●	●	●
	IP Phone							●	●	●		
	AP Router				●	●	●	●	●			
Consumer	Digital TV					●	●	●	●			
	Digital Audio/ DAM		●	●	●							
	DVD Player					●	●	●				
	Set Top Box					●	●	●	●	●	●	●
Automotive	After Market/In Cabin	●	●	●	●	●	●	●	●	●	●	●

Serial Flash Example

MX 25L 256 35 F M I - 10 G

DEVICE :  
25L/66L: 3V, Serial Flash  
25U/66U: 1.8V, Serial Flash  
25V: 2.5V, Serial Flash

DENSITY :  
512: 512Kb  
10: 1Mb  
20: 2Mb  
40: 4Mb  
80: 8Mb  
16: 16Mb  
32: 32Mb  
64: 64Mb  
128: 128Mb  
256/257: 256Mb  
512: 512Mb

MODE :  
06: Single-in, Dual-out  
26: Default lock protection  
33/35: MXSMIO®- Multi-in, Multi-out  
36: MXSMIO®- Single-in, Multi-out  
55: MXSMIO®- Security type  
73: MXSMIO® Duplex- Multi I/O,  
Quad I/O Permanent Enable

OPTION :  
G: RoHS Compliant

SPEED :  
08: 133MHz  
10: 104MHz / 108MHz  
12: 80MHz / 86MHz  
13: 75MHz  
15: 66MHz  
20: 45MHz

TEMPERATURE RANGE :  
I: Industrial (-40°C to 85°C)  
S: Automotive Grade 3  
(-40°C to 85°C)  
R: Automotive Grade 2  
(-40°C to 105°C)  
Q: Automotive Grade 1  
(-40°C to 125°C)

PACKAGE TYPE :  
P: PDIP  
ZN: 8-WSO  
Z2: 8-WSO (8x6mm)  
Z3: 8-WSO (6x5mm)  
Z4: 8-WSO (8x6mm) 3.4X4.3EP  
ZU: 8-USO  
ZB: 8-USO (4x3mm)  
M: SOP  
MB: 200mil 8-VSOP  
O: 173mil 8-TSSOP  
X: BGA

GENERATION





# Parallel NOR Flash

Macronix offers a variety of 3V Parallel Flash memories in densities from 4Mb to 1Gb. Our solutions provide customers with cost-effective, high-performance, and reliable products that offer low power consumption and high endurance. 4Mb and 8Mb products are also offered in 4mm x 6mm BGA packages for space-constrained applications.

Macronix also offers a family of 1.8V products from densities of 4Mb to 128Mb, whereas the 16Mb and 32Mb products interface an I/O voltage of 1.8V, and the 32Mb to 128Mb products are featured in AD-Mux and Burst Mode. These products are used in Bluetooth, MP3 Players, GPS, as well as other portable applications.

## Standard Read Access

The standard read access Parallel Flash series (MX29F, MX29LV and MX29SL) offer Boot and Uniform Sector architectures in x8, x16, and x8/x16 configurations at single 5V, 3V, and 1.8V power-supply voltages.

## Page Mode Read Access

The MX29GL product series provide an advanced page mode interface to optimize the system performance for both read and program operations.

Applications	≤8Mb	16Mb	32Mb	64Mb	128Mb	256Mb	512Mb	1Gb
Bluetooth	●	●						
AP Router		●	●	●	●			
Wimax/LTE				●	●	●		
IAD/Home Gateway			●	●	●	●	●	●
Switching Router				●	●	●	●	●
Enterprise	●	●	●	●	●	●	●	●
Digital TV		●	●	●	●	●		
Set Top Box			●	●	●	●	●	●
G-PON			●	●	●	●		
Telematics	●				●	●	●	●
IP Phone			●	●	●	●	●	
DSC			●	●	●	●	●	●
Gaming				●	●	●	●	●
Automotive	●	●	●	●	●	●	●	●

### Parallel Flash Example

MX 29GL 512 F H X I - 90 Q

**DEVICE :**  
29F: 5V  
29LV / 29GL / 68GL: 3V  
29SL: 1.8V  
29LA/ 29GA: Security type

**DENSITY :**  
20x: 2Mb  
40x: 4Mb  
80x: 8Mb  
16x: 16Mb  
32x: 32Mb  
64x: 64Mb  
12x: 128Mb  
25x: 256Mb  
51x: 512Mb  
1Gx: 1Gb

**GENERATION**

**SPEED :**  
55: 55ns  
70: 70ns  
90: 90ns  
10: 100ns  
11: 110ns

**OPTION :**  
G: RoHS Compliant  
Q: Restricted  
Vcc : (3.0V~3.6V),  
RoHS Compliant

**TEMPERATURE RANGE :**  
C: Commercial(0°C to 70°C)  
I: Industrial(-40°C to 85°C)  
S: Automotive Grade 3(-40°C to 85°C)  
R: Automotive Grade 2(-40°C to 105°C)  
Q: Automotive Grade 1(-40°C to 125°C)

**BLOCK TYPE :**  
T: Top Boot  
B: Bottom Boot  
H: Uniform Sector, Highest Address Sector Protected  
L: Uniform Sector, Lowest Address Sector Protected  
U: VI/O=1.65 to VCC, VCC=2.7 to 3.6V, Highest Address Sector Protected  
D: VI/O=1.65 to VCC, VCC=2.7 to 3.6V, Lowest Address Sector Protected

## Standard Read Access Family

Part Number	Density	Bus Width	Access Time(ns)	Package	Vcc.	Features	Automotive Grade
<b>5V Series</b>							
MX29F200CT/B	2Mb	x8/ x16	70 / 90	44-SOP, 48-TSOP	5V	Boot Sector	
MX29F040C	4Mb	x8	70 / 90	32-TSOP, 32-PLCC	5V	Uniform Sector	
MX29F400CT/B	4Mb	x8/ x16	70 / 90	44-SOP, 48-TSOP	5V	Boot Sector	
MX29F800C T/B	8Mb	x8/ x16	70 / 90	44-SOP, 48-TSOP, 48-LFBGA	5V	Boot Sector	
<b>3V Series</b>							
MX29LV040C	4Mb	x8	55 / 70 / 90	32-TSOP, 32-PLCC	3V	Uniform Sector	
MX29LV400CT/B	4Mb	x8/ x16	55 / 70 / 90	44-SOP, 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA	3V	Boot Sector	
MX29LV800CT/B	8Mb	x8/ x16	55 / 70 / 90	44-SOP, 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFLGA	3V	Boot Sector	-40°C to 105°C
MX29LV160DT/B	16Mb	x8/ x16	70	48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFLGA	3V	Boot Sector	-40°C to 85°C
MX29LV161DT/B	16Mb	x16	90	48-TSOP, 48-WFBGA, 48-TFBGA, 48-XFLGA	3V	Boot Sector; V I/O=1.8V	
MX29LV320ET/B	32Mb	x8/ x16	70	48-TSOP, 48-TFBGA, 48-LFBGA, 44-SOP	3V	Boot Sector	-40°C to 105°C
MX29LV321DT/B	32Mb	x16	90	48-TSOP, 48-TFBGA	3V	Boot Sector; V I/O=1.8V	
MX29LV640ET/B	64Mb	x8/ x16	70	48-TSOP, 48-TFBGA	3V	Boot Sector	-40°C to 85°C
<b>1.8V Series</b>							
MX29SL402CT/B	4Mb	x8/ x16	90	48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFBGA	1.8V	Boot Sector	
MX29SL800CT/B	8Mb	x8/ x16	90	48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFBGA	1.8V	Boot Sector	

## 1.8V AD-Mux Parallel Family

Part Number	Density	Bus Width	Access Time(ns)	Package	Features
MX29NS320E	32Mb	x16	80	56 TFBGA	AD-Mux; Burst Mode
MX29NS640E	64Mb	x16	80	56 TFBGA	AD-Mux; Burst Mode
MX29NS128E	128Mb	x16	80	56 TFBGA	AD-Mux; Burst Mode
MX29VS128F	128Mb	x16	80	56 TFBGA	AD-Mux; Burst Mode Read While Write

## Page Mode Read Access Family

Part Number	Density	Bus Width	Access Time(ns)	Package	Vcc.	Features	Automotive Grade
MX29GL320EH/L	32Mb	x8/ x16	70	56-TSOP, 64-LFBGA	3V	Uniform Sector	-40°C to 105°C
MX29GL320ET/B	32Mb	x8/ x16	70	48-TSOP, 48-LFBGA	3V	Boot Sector	-40°C to 105°C
MX29GL640EH/L	64Mb	x8/ x16	70	56-TSOP, 64-LFBGA	3V	Uniform Sector	-40°C to 105°C
MX29GL640ET/B	64Mb	x8/ x16	70	48-TSOP, 48-LFBGA	3V	Boot Sector	-40°C to 105°C
MX29GL128EH/L	128Mb	x8/ x16	90	56-TSOP, 64-FBGA, 64-LFBGA, 70-SSOP	3V	Uniform Sector	-40°C to 105°C
MX29GL128FH/L	128Mb	x8/ x16	70/90	56-TSOP, 56-FBGA, 64-LFBGA, 70-SSOP	3V	Uniform Sector	-40°C to 105°C
MX29GL128FU/D	128Mb	x8/ x16	110	56-TSOP, 56-FBGA, 64-LFBGA	3V	V I/O=1.8V; Uniform Sector	
MX29GL256FH/L	256Mb	x8/ x16	90	56-TSOP, 56-FBGA, 64-LFBGA	3V	Uniform Sector	-40°C to 105°C
MX29GL256GH/L*	256Mb	x8/ x16	90	56-TSOP, 56-FBGA, 64-LFBGA	3V	Uniform Sector	-40°C to 85°C
MX29GL256FU/D	256Mb	x8/ x16	110	56-TSOP, 56-FBGA, 64-LFBGA	3V	V I/O=1.8V; Uniform Sector	
MX29GL512FH/L	512Mb	x8/ x16	100	56-TSOP, 56-FBGA, 64-LFBGA	3V	Uniform Sector	-40°C to 105°C
MX29GL512GH/L*	512Mb	x8/ x16	100	56-TSOP, 56-FBGA, 64-LFBGA	3V	Uniform Sector	-40°C to 85°C
MX29GL512FU/D	512Mb	x8/ x16	110	56-TSOP, 64-LFBGA	3V	Uniform Sector	-40°C to 105°C
MX68GL1G0FH/L	1Gb	x8/ x16	110	56-TSOP, 64-LFBGA	3V	Uniform Sector	-40°C to 105°C
MX68GL1G0GH/L*	1Gb	x8/ x16	100	56-TSOP, 64-LFBGA	3V	Uniform Sector	-40°C to 85°C
MX68GL1G0FU/D	1Gb	x8/ x16	120	56-TSOP, 64-LFBGA	3V	Uniform Sector	

\* Advance Information





# Secure Flash

Some customers have sensitive data stored in their systems on flash memory. To protect such data against hostile access, Macronix provides several Secure Flash products. We provide Parallel Secure Flash products in densities from 32Mb to 1Gb, and Serial Secure Flash products in densities from 16Mb to 256Mb - typically used in applications like Set-Top Boxes, Digital TVs, and other systems requiring security of their code and data.

Please contact our regional sales representatives for detailed specifications.

## Parallel Secure NOR Flash Family

Part Number	Density	Organization	Access Time(ns)	Package	Vcc.	Features
Standard Read Access Series						
MX29LA320DH/L	32Mb	x8 / x16	70	64-FBGA	3V	Uniform Sector
MX29LA320EH/L	32Mb	X8 / x16	70	64-FBGA	3V	Uniform Sector
MX29LA321DH/L	32Mb	x8 / x16	70	64-FBGA	3V	Uniform Sector
MX29LA640EH/L	64Mb	x8 / x16	70	64-FBGA	3V	Uniform Sector
MX29LA641DH/L	64Mb	x8 / x16	90	64-FBGA	3V	Uniform Sector
Page Mode Read Access Series						
MX29GA320EH/L	32Mb	x8 / x16	70	64-FBGA	3V	Uniform Sector
MX29GA321EH/L	32Mb	x16	70	64-FBGA	3V	Uniform Sector
MX29GA640EH/L	64Mb	x8 / x16	90	64-FBGA	3V	Uniform Sector
MX29GA641EH/L	64Mb	x16	90	64-FBGA	3V	Uniform Sector
MX29GA128FH/L	128Mb	x8 / x16	90	64-FBGA	3V	Uniform Sector
MX29GA129FH/L	128Mb	x16	90	64-FBGA	3V	Uniform Sector
MX29GA256FH/L	256Mb	x8 / x16	90Q	64-FBGA	3V	Uniform Sector
MX29GA256GH/L*	256Mb	x 8 / x16	90	64-FBGA	3V	Uniform Sector
MX29GA257FH/L	256Mb	x16	90Q	64-FBGA	3V	Uniform Sector
MX29GA512FH/L	512Mb	x8 / x16	110	64-FBGA	3V	Uniform Sector
MX29GA512GH/L*	512Mb	x 8/ x16	100	64-FBGA	3V	Uniform Sector
MX68GA1G0FH/L	1Gb	x8 / x16	110	64-FBGA	3V	Uniform Sector
MX68GA1G0GH/L*	1Gb	x 8 / x16	100	64-FBGA	3V	Uniform Sector

\* Advance Information

## Serial Secure NOR Flash Family

Part No.	Density	Organization	I/O Bus	Clock Speed(MHz)	Packages	Vcc.
MX25L1608E	16Mb	4KB / 64KB	Single/ Dual	86(x1), 80(x2)	200mil 8-SOP	3V
MX25L1655D	16Mb	4KB / 64KB	Single/Dual/Quad	104(x1), 75(x2, x4)	200mil 8-SOP, 24-BGA(6x8mm)	3V
MX25L3208E	32Mb	4KB / 64KB	Single/ Dual	86(x1), 80(x2)	200mil 8-SOP	3V
MX25L3255E	32Mb	4KB / 32KB / 64KB	Single/Dual/Quad	104(x1 x4), 86(x2)	200mil 8-SOP, 24-BGA(6x8mm)	3V
MX25L6408E	64Mb	4KB / 64KB	Single/ Dual	86(x1), 80(x2)	200mil 8-SOP, 300mil 16-SOP, 8-WSO(8x6mm)	3V
MX25L6456E	64Mb	4KB / 32KB / 64KB	Single/Dual/Quad	104(x1 x4), 86(x2)	200mil 8-SOP,24-BGA(6x8mm)	3V
MX25L12855F	128Mb	4KB / 32KB / 64KB	Single/Dual/Quad	133(x1,x2,x4)	300mil 16-SOP,24-BGA(6x8mm)	3V
MX25L25655F	256Mb	4KB / 32KB / 64KB	Single/Dual/Quad	133(x1,x2,x4)	300mil 16-SOP,24-BGA(6x8mm)	3V

# KGD (Known Good Die)

We also offer Known Good Die for System in Package (SiP) solutions.

Please contact Macronix regional sales for datasheet & technical support.

## KGD Flash Portfolio

### Parallel Flash

Vcc.	Product Series	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb
3V	MX29LV (Boot Sector)	●	●	●	●	●		
	MX29GL (Uniform Sector)				●	●	●	●
1.8V	MX29SL	●	●					
	MX29NS				●	●	●	
	MX29VS						●	

### Serial Flash

Vcc.	Product Series	512Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb	128Mb	256Mb
3V	MX25L(Single I/O)	●	●	●	●	●	●	●	●	●	●*
	MX25L(Multi I/O)	●	●	●	●	●	●	●	●	●	●*
2.5	MX25V	●	●	●	●	●					
1.8V	MX25U			●	●	●	●	●	●	●*	●*

\* Advance Information





# NAND Flash

Macronix is a leader in the embedded NOR Flash market. Over the years as the NOR requirements have evolved - from Parallel to Serial interface and from 3V to low power products - Macronix has enhanced its product portfolio to meet the market demands. Today, as embedded applications get more complex, the flash memory density requirements have grown as well. An increasing number of system designers are looking for choices when selecting higher-density flash memory to store their code and/or applications. Macronix has met their expectations with the introduction of a SLC NAND product line to complement its existing high-density NOR products. Focusing on the low-density NAND market, Macronix currently offers 512Mb and 1Gb SLC NAND products with industry-standard packages and features.

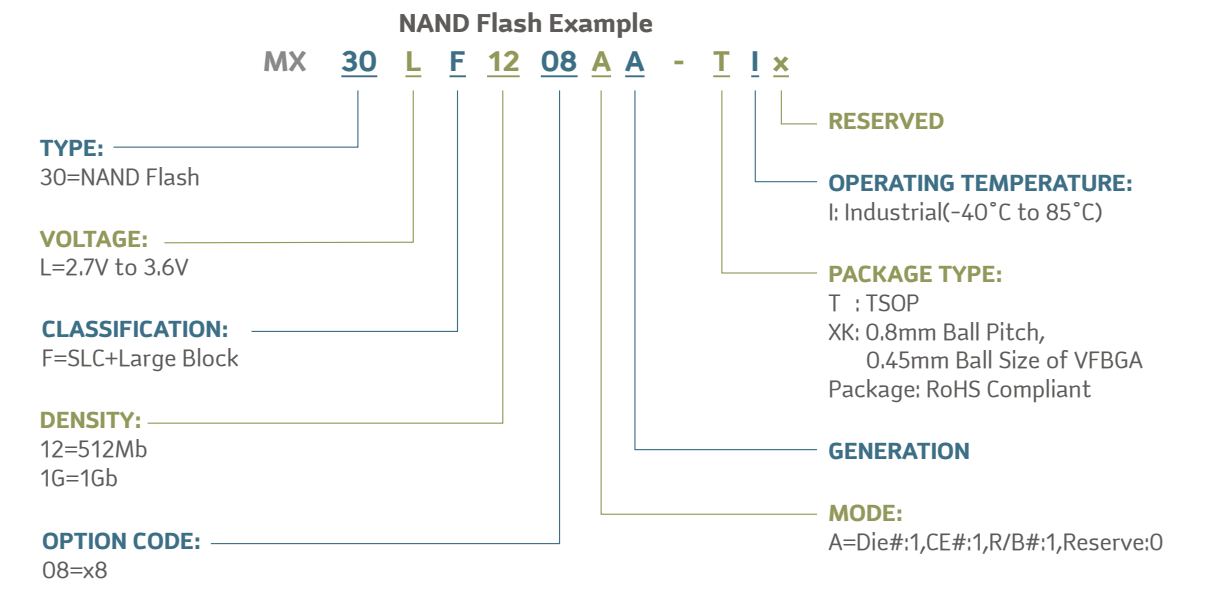
Part number	Density	Cell Type	Page Size	Bus Width	Sequential Read Speed(ns)	Package	Vcc.	Temperature Range
MX30LF1208AA	512Mb	SLC	2KB	x8	30ns	48-TSOP(12x20mm) 63-VFBGA(9x11mm)	3V	-40°C ~ 85°C
MX30LF1G08AA	1Gb	SLC	2KB	x8	30ns	48-TSOP(12x20mm) 63-VFBGA(9x11mm)	3V	-40°C ~ 85°C

# MCP Solutions

Macronix MCP (Multi-Chip-Package) solutions provide flexible choices and fast time to market for both embedded and wireless applications. With small footprints and backward-compatible pinouts, our products allow customers to choose from different densities to satisfy their cost-effective solutions.

Part Number	Product Type	NOR Density	pSRAM Density	NOR Voltage	pSRAM Voltage	NOR Bus Width	pSRAM Bus Width	Package Type	Package Dimension
MX69GL640E	De-Mux	64Mb	32Mb	3V	3V	x16	x16	56TFBGA	7.0x9.0
MX69GL127E	De-Mux	128Mb	32Mb	3V	3V	x16	x16	56TFBGA	7.0x9.0
MX69V28F64	AD-Mux	128Mb	64Mb	1.8V	1.8V	x16	x16	56TFBGA	6.2x7.7
MX69N64E32	AD-Mux	64Mb	32Mb	1.8V	1.8V	x16	x16	56TFBGA	6.2x7.7
MX69N28E64	AD-Mux	128Mb	64Mb	1.8V	1.8V	x16	x16	56TFBGA	6.2x7.7
MX65U64F32	QPI Mode	64Mb	32Mb	1.8V	1.8V	x4	x16	56TFBGA	6.2x7.7
MX65U28F64	QPI Mode	128Mb	64Mb	1.8V	1.8V	x4	x16	56TFBGA	6.2x7.7

## NAND Flash Example







# ROM(Read-Only Memory)

As the leader in the ROM industry, we continue to provide cutting-edge ROM products to our valued customers. Migrating from Mask ROM to XtraROM, Macronix has made ROM products more flexible in production and delivery, while preserving high quality and cost advantages.

Macronix ROM products have been widely used, from game cartridges to slot machines to toys to learning devices. In the past decade, we have invested much on ROM products. In the future, we will continue developing advanced technology to make ROM a preferred medium for content publishing.

## XtraROM

XtraROM is the leading ROM technology from Macronix without mask charge and with short TAT (Turn Around Time). With a proven record of delivery and quality, XtraROM offers a robust medium for content publishing. The host MCU solely must READ the contents; it need not worry about bad blocks, wear leveling, and ECC. XtraROM is classified into three categories: NAND XtraROM, Gaming Machine XtraROM, and ASIC XtraROM.

### ✓ NAND XtraROM

Part No.	Density	Bus Width	Access Time(ns)	Latency(us)	Vcc	Package
MX23J51243	512Mb	x8	25	25	2.7~3.6V	48-TSOP
MX23J1G43	1Gb	x8	25	80	2.7~3.6V	48-TSOP
MX23J2G43*	2Gb	x8	25	80	2.7~3.6V	48-TSOP
MX23J4G43*	4Gb	x8	25	80	2.7~3.6V	48-TSOP

\* Advance Information

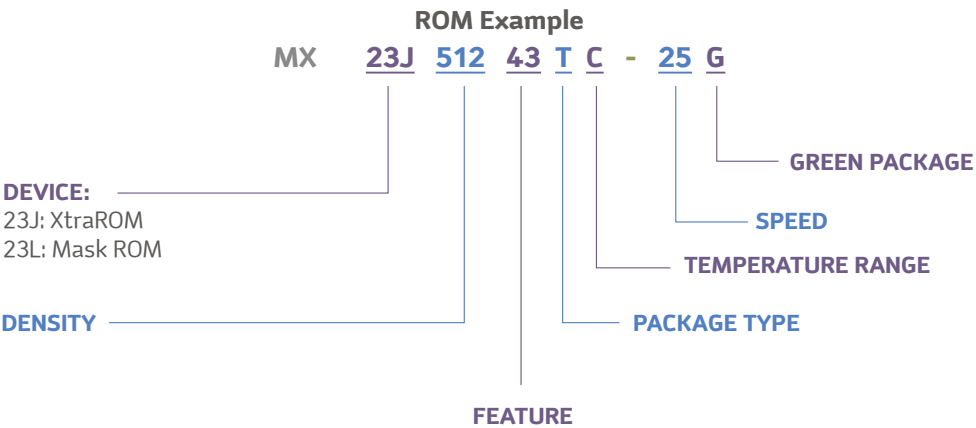
This device is pad-compatible with NAND, but much more robust than NAND. It is popularly used as a cartridge for learning platforms.

### ✓ Gaming Machine XtraROM

This device, while maintaining the checksum of the content during the lifetime of gaming machines, is widely used in Pachinko and PachinSlot for video/audio, and code storage. It is featured in 32 I/O with fast speed, 70-SSOP package, and up to 32Gb in density.

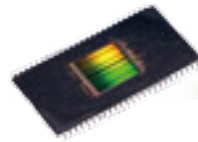
### ✓ ASIC XtraROM

Macronix excels at customized XtraROM from IC design to content programming to quick delivery. We can build your DRM (Digital Right Management) scheme in the circuit of XtraROM to protect your content against piracy. Our designs are used in handheld gaming consoles over the world.





# Package Options



Macronix provides products with extremely small packages as well as very thin profiles for space-constrained applications.

## Parallel Packages



48 TFBGA  
(Ball Dia.0.3)

Length	8
Width	6
Thickness	1.2
Pitch	0.8
	(mm)



56 FBGA  
(Ball Dia.0.4)

Length	9
Width	7
Thickness	1.2
Pitch	0.8
	(mm)



44 SOP (500mil)

Length	28.5
Width	12.6
Thickness	3
Pitch	1.27
	(mm)



48 LFBGA  
(Ball Dia.0.4)

Length	8
Width	6
Thickness	1.3
Pitch	0.8
	(mm)



63 VFBGA  
(Ball Dia. 0.45)

Length	9
Width	11
Thickness	1.0
Pitch	0.8
	(mm)



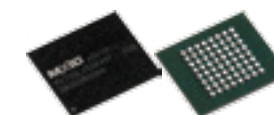
48 TSOP (Standard Type)

Length	20
Width	12
Thickness	1.2
Pitch	0.5
	(mm)



48 WFBGA  
(Ball Dia. 0.3)

Length	6
Width	4
Thickness	0.75
Pitch	0.5
	(mm)



64 FBGA  
(Ball Dia. 0.4)

Length	13
Width	10
Thickness	1.2
Pitch	1.0
	(mm)



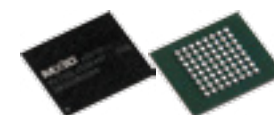
56 TSOP (Standard Type)

Length	20
Width	14
Thickness	1.2
Pitch	0.5
	(mm)



48 XFLGA  
(Land Open 0.25)

Length	6
Width	4
Thickness	0.5
Pitch	0.5
	(mm)



64 LFBGA  
(Ball Dia. 0.6)

Length	13
Width	11
Thickness	1.4
Pitch	1.0
	(mm)



70 SSOP

Length	28.5
Width	16.03
Thickness	3.05
Pitch	0.8
	(mm)

## Serial Packages



8 SOP (150mil)

Length	6
Width	5
Thickness	1.75
Pitch	1.27
	(mm)



8 SOP (200mil)

Length	7.9
Width	5.23
Thickness	2.16
Pitch	1.27
	(mm)



16 SOP (300mil)

Length	10.3
Width	10.3
Thickness	2.65
Pitch	1.27
	(mm)



24 BGA (Ball Dia.0.4)

Length	8
Width	6
Thickness	1.2
Pitch	1.0
	(mm)



8 WSON (8x6)

Length	8
Width	6
Thickness	0.8
Pitch	1.27
	(mm)



8 WSON (6x5)

Length	6
Width	5
Thickness	0.8
Pitch	1.27
	(mm)



8 USON (4x4)

Length	4
Width	4
Thickness	0.6
Pitch	0.8
	(mm)



8 USON (2x3)

Length	3
Width	2
Thickness	0.6
Pitch	0.5
	(mm)



Wafer Level  
Chip Scale Package  
(WLCSP)

The result package is subject to various die sizes. The smallest chip so far is 1.46mm x 1.40mm.



[www.macronix.com](http://www.macronix.com)